Air Force
Research Laboratory
AFRL

Unleashing the power of innovative aerospace technology....

news@afrl

Winter 1999/2000 **Official voice of the Air Force Research Laboratory** **Volume IV**

Laboratory announces new executive director

WRIGHT-PATTERSON AFB, OHIO. — The Air Force Research laboratory headquartered here, announced recently its new executive director is Robert J. May Jr. of San Antonio AIr Logistics Center, Air Force Materiel Command, Kelly AFB, Texas. May replaces Tim Dues, the acting director.....2

Science Fair Program recognizes imagination of tomorrow's S&Es

WRIGHT-PATTERSON AFB, OHIO — Amidst a room filled with the ideas and products that will help to develop the technologies of tomorrow gather 300 inquisitive minds. These minds belong to junior high and high school students participating in one of many regional science fairs that AFRL sponsors.....3

Directorate garners role in Antarctic rescue

WRIGHT-PATTERSON AFB, OHIO — Members of two directorates aid in an Antarctic rescue.....3

Airborne Laser flies during Kodak Balloon Fiesta

KIRTLAND AFB, N.M. — Among nearly 900 hot-air balloons that floated over the New Mexico desert in Albuquerque, one reflected the program managed by the Airborne Laser System Program Office...4

Additional information is available online including:

- **Breaking News Features**
- **Corporate Calendar**
- **Contact Information**
- **Archives of Spring, Summer and Fall editions**

Nielsen named commander of AFRL

by Vicki Stein, AFRL Headquarters

WRIGHT-PATTERSON AFB, OHIO — Brigadier General Paul D. Nielsen, who has served as Vice Commander, Aeronautical Systems Center since June 1999 has been named commander of the Air Force Research Laboratory, Wright-Patterson Air Force Base, Ohio replacing Maj. Gen. Richard "Dick" Paul.

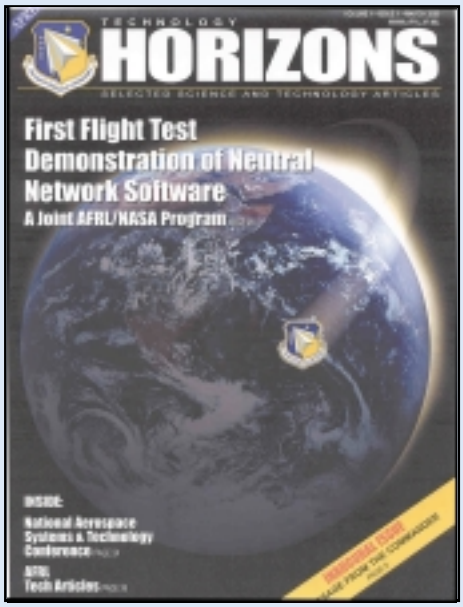
Nielsen will succeed Maj. Gen. Richard R. Paul, who is retiring effective June 1 after a 33-year military career. Paul became the first AFRL commander when the organization was established in October 1997.

As AFRL commander, Nielsen will direct the Air Force's annual $2.2 billion science and technology program which is executed by more than 5,800 people in the laboratory's component technology directorates and the Air Force Office of Scientific Research. The Air Force Research Laboratory plans, manages and conducts research and development activities for the Air Force to advance the entire range of aerospace and interrelated

(SEE COMMANDER/P.4)

The proof is in print with the premiere of *AFRL Technology Horizons* magazine

by Timothy Anderl, AFRL Headquarters **(SEE MAGAZINE/P.5)**



HOT OFF THE PRESSES — AFRL Technology Horizons, a magazine patterned after NASA Tech Briefs magazine, will reach 200,000 doorsteps beginning in March 2000. The magazine will contain technical articles, sections and departments that focus on technology transfer upcoming or recent AFRL conferences, specific directorates, requests for proposals, facilities, broad agency announcements, interesting commercial applications and additional topics. The magazine will enhance AFRL's technology transition programs by communicating with industry and academia's potential partners.

In This Issue:

Unleashing the power of innovative aerospace technology....

news@*afrl*

Winter 1999/2000 **Official voice of the Air Force Research Laboratory**

Commander
Maj. Gen. Richard Paul

Executive Editor
Vicki Stein

Production Editor
Tim Anderl

news@afrl is published quarterly by the Office of Public Affairs of Air Force Research Laboratory Headquarters. Contact the office at AFRL/PA 1864 Fourth St. Suite. 1, Wright-Patterson AFB, Ohio, 45433-7131, (937) 656-9010/9876, or send e-mail to AFRL.PA@afrl.af.mil. Contents of this newsletter are not necessarily the official views of, or are endorsed by, the U.S. Government, the Department of Defense or the Department of the Air Force. The editorial content is edited, prepared and provided by this office. Photographs are official U.S. Air Force photos unless otherwise indicated. Submission guidelines are available from this office or on-line. Electronic copies and additional full-text articles are available on-line at:

http://intra.afrl.af.mil/news

AF Laboratory announces new executive director

by Timothy Anderl, AFRL Headquarters

WRIGHT-PATTERSON AFB, OHIO — Wright-Patterson AFB, Ohio, — The Air Force Research Laboratory, headquartered here, announced recently its new executive director, Robert J. May Jr. of San Antonio Air Logistics Center, Air Force Materiel Command, Kelly AFB, Texas.

"We've conducted an extensive search for someone with the right mix of technical prowess, leadership ability, hands-on-experience, and stature within the research community," said Maj. Gen. Richard R. Paul, AFRL commander. "Bob May meets all those criteria. We're delighted to have him join the AFRL team."

May will be the principal assistant to the Commander and Senior Civilian Executive for overall management of the Air Force's science and technology programs. Currently, he is the product group manager of propulsion systems at the San Antonio Air Logistics Center, a position he has held for almost six years.

The AFRL executive director gives executive level direction to subordinate organizations, advises the commander on proposed actions or solutions to pressing problems, assures sound management and technical approaches to the science and technology program, and appraises the progress being made on the stated goals and objectives of the organization. He also represents the commander throughout government, industry and academia, and interfaces and coordinates with local, state, and other federal government, as well as international science and technology organizations.

As the laboratory's senior civilian, the executive director participates with equivalent senior level leaders elsewhere in the command to address command-wide policy or procedural issues that impact the accession, enhancement and retention of civilian leadership personnel. **@**

Find additional Fe@tures on the web.....

Sensitive Camera arrives for Airborne Laser

Puff Daddy's appearance excites lab scientists

Officials open bids for AFRL A-76 studies

Provider of magnet technology dies in crash

Science Fair program recognizes tomorrow's S&Es

by Timothy Anderl, AFRL Headquarters

WRIGHT-PATTERSON AFB, OHIO — Amidst a room filled with the ideas and products that will help to develop the technologies of tomorrow gather 300 inquisitive minds. Colonel James Heald, Vice Commander of the Air Force Research Laboratory, steps to the front of this hushed pack to offer a few words of introduction to, who he realizes are, the scientific piers of the future Air Force.

"The wellspring of our future endeavors is sitting in this room today," Heald said. "You are the inventors and problem-solvers, with a fervor for science and technology that the Air Force is unable to ignore."

Though one may guess that Heald was addressing a group of specialized, degree-holding scientists at a symposium or some other technical conference, Heald's words were meant for a group of junior high and high school students competing in one of many regional science fairs that AFRL sponsors each year.

The Air Force has been participating in regional fairs for six years and in international fairs since 1965. IT supports 350 regional fairs in the United States and Puerto Rico annually and presents more than 2,400 awards.

At the regional level, AFRL presents first second and third place awards to the top three entries in the junior and senior divisions. These fairs feature 1.5 million students competing at individual school and local levels for a chance to advance to the International Science and Engineering Fair held every May.

Air Force judges typically encourage projects with Air Force applicability that feature science math and engineering.

According to Susan Sobieski, Air Force Science Fair program manager, the Air Force has several goals for the Science Fair Program. Stirring scientific interest in youth, parents, schools and communities is the primary reason the Air Force encourages representatives who are applying their research and knowledge to attend these fairs. Equally as important is the opportunity to recognize and encourage students who are already conducting research in science, math and engineering, and to acquaint students with Air Force career possibilities in the science and engineering fields, she said.

"We know that the way to strengthen the nation's technology future is through the ideas and imaginations of its young people," Sobieski said.

"The Air Force today is and has been, based on technological superiority; having the best equipment, weapon

(SEE SCIENCE FAIR/P.5)

Directorates garner important role in Antarctic rescue

Reported by Propulsion and Materials and Manufacturing Directorate

SOUTH POLE — People may think that materials and fuels research have little to do with the Air Force's operational mission. Lt. Col. Ed Kinowski, of the New York Air National Guard, begs to differ.

When he and other members of the Schenectady-based 109th Airlift Wing were planning their recent mission to the South Pole to rescue Dr. Jerri Nielson, they called the Air Force Research Laboratory Materials and Manufacturing and Propulsion Directorates.

Nielson discovered a lump on her breast while she was stationed at the National Science Foundation's Amundsen-Scott South Pole Station. She needed to be evacuated for treatment, but the harsh weather of the Antarctic winter delayed rescue attempts.

Carl "Ed" Snyder, a senior research engineer in fluids and lubricants at the Materials Directorate, received a call from Kinowski June 29. The colonel told Snyder, "We don't usually do this, but if we did fly down to the South Pole during their winter, would the performance of the lubricants at temperatures down to minus 80 degrees present a problem?"

Snyder wasn't certain he knew all the different lubricants used on the LC-130, so Kinowski faxed him a list of 13 lubricants and told him that he needed a response in two days. Having spent 37 years in materials research, Snyder only needed one day.

Snyder provided guidance on which materials could cause a problem if the aircraft stayed on the ground for a long period, such as overnight. He told Kinowski that if they land and take off in a reasonable amount of time, it wouldn't be a problem. And that's what they did.

Colonel Kinowski also contacted the Propulsion Directorate to ask about problems which they might have with fuels due to the weather.

"Fuels are a somewhat different problem than lubricants, in that we can pick which fuels to use in the aircraft," said Cindy Obringer, fuels engineer at the Propulsion Directorate. "Of course we had slim pickings since the fuel we picked had to be available where we needed it and in Antarctica, that means only two locations. Also because of the long duration we had to refuel at one of the locations."

"The Air Force had already placed special fuel with a low freeze point at McMurdo Station and we already had samples here that had been analyzed so we didn't have to do an analysis, but we did look at the existing fuels and their freeze points," she said. "And we made recommendations on refueling, since they couldn't fly the entire mission without refueling. We recommended that they refuel at McMurdo Air Station and not at the South Pole since the fuel at McMurdo Air Station had a lower freeze point. I also made recommendations on how to refuel; for example we recommended that they check the refueling pumps on the ground at McMurdo Air Station in advance of the mission to assure they would work properly once the aircraft arrived."

Nielsen was safely evacuated last month, due in part to the advice Obringer and Snyder provided. **@**

Commander (from page 1)

technologies.

Nielsen will also serve as the Air Force's technology executive officer. In that position, he will determine the investment strategy for the full spectrum of Air Force science and technology activities.

Prior to his assignment as Vice Commander at

Brig. Gen. Paul D. Nielsen

ASC, Nielsen was named a command director of the North American Aerospace Defense Command Combat Operations Staff at the Cheyenne Mountain Air Station, Colorado Springs, Colo. He was named chief of Operations for the Cheyenne Mountain Operations Center in October 1996 and, beginning in May 1997, served as director of plans, Headquarters North American Aerospace Defense Command at Peterson Air Force Base, Colo. Nielsen served as Rome Laboratory commander from July 1992 through March 1995.

Nielsen is a native of New Orleans, La., and a distinguished graduate of the U.S. Air Force Academy with bachelor of science degrees in physics and mathematics. He earned a master of science degree in applied physics at the Livermore campus of the University of California, Davis, as a Hertz Foundation fellow. He returned to Livermore, again as a Hertz Foundation fellow, and was awarded his doctorate in plasma physics from the University of California, Davis, in 1981. He also holds a master's of business administration degree from the University of New Mexico and is a graduate of National War College.

For additional information, visit his Air Force biography at www.af.mil/news/biographies/nielsen_pd.html. **@**

FULL OF HOT AIR? – Framed against the White Sands Monument of White Sands N.M., a balloon representing the Airborne Laser Program (ABL) lifts off. The balloon made a practice flight in September in preparation for the Kodak Albuquerque International Balloon Fiesta that took place in Albuquerque October 2.

Airborne Laser balloon flies during Kodak Balloon Fiesta

Reported by Directed Energy Directorate and Sandra Carol-Allen

KIRTLAND AFB, N.M. — Among the nearly 900 hot-air balloons that floated over the New Mexico desert in Albuquerque, one reflected an Air Force acquisition program, managed by the Airborne Laser System (ABL) Program Office.

This is the second year ABL has been highlighted at the Kodak Albuquerque International Balloon Fiesta, advertised as the most photographed event in the world.

An illustration stretched across the multi-colored balloon shows ABL in action; a beam of light being fired from a jumbo jet, destroying a missile.

The nine-day fiesta, featured 898 balloons from 20 countries and more than a million spectators. According to fiesta officials, the Albuquerque event attracted about 20 percent of the total known balloons worldwide.

The ABL director, Col. Mike Booen said the annual balloon fiesta is an ideal opportunity to highlight the program as an effective deterrent to a theater ballistic missile attack.

Booen explained that several of the technologies that made the program possible were developed in New Mexico. He added that the production of ABL is one-third completed and is within 1 percent of the schedule and budget. **@**

Magazine (from page 1)

WRIGHT PATTERSON AFB, OHIO – The Air Force Research Laboratory Commander, Maj. Gen. Dick Paul, recently announced plans to debut a quarterly technical publication. The premier issue of AFRL Technology Horizons magazine is scheduled to debut in March.

The magazine, which is patterned after NASA Tech Briefs magazine, will reach the doorsteps of 200,000 subscribers from government, academia and industry.

The magazine will contain many types of articles, the most significant being technical articles submitted by AFRL scientists and engineers.

"AFRL Technology Horizons will offer exciting opportunities for the laboratory to communicate with its peers, and potential peers, in academia and industry," said Paul. "Because about 75 percent of our research and development budget is outsourced to academia and industry, the magazine will help us continue to develop stronger technologies and relationships with our peers."

The technical articles that are published will be supplemented by a Technical Support Package (TSP). The package will include: official reports; white papers; previously published articles; status reports; research papers; or any other published product that provides readers with additional information on the subject matter.

The laboratory also provides a technology clearinghouse for readers interested in any of the technical articles, programs, or organizational information that appear in the magazine. The TECH CONNECT hotline can be reached at (800) 203-6451.

AFRL Technology Horizons Program Manager Susan Wapelhorst said she hopes the magazine will enhance AFRL's technology transfer and technology transition programs by relaying research and development activities going on within the lab.

"By collaborating on the best scientific ideas in the past, AFRL and their partners have developed stronger materials for bridges, safer race cars and even better compact discs," Wapelhorst said. "By regularly communicating our research, innovations and focus areas with over 200,000 industry, academic and government readers a tremendous opportunity exists to impact the world around us. We'll be able to transfer more of our AFRL technology out to industry and academia, thereby returning the benefits of our taxpayers money back into the US economy."

For more information about Technology Horizons, contact Wapelhorst at susan.wapelhorst@afrl.af.mil or call her at (937) 255-0065. **@**

Science Fair (from page 3)

systems and minds driving our organization," Heald said. "We never ceased to be amazed at the foresight, intuition and dedication each of these young people possess."

According to AFRL's commander Maj. Gen. Richard Paul the Air Force has a 2 billion dollar a year budget, 75 percent of which is spent on partnerships with academia and industry. Because of the Air Force's widespread interactions with these non-government agencies, Paul said it is important to build a relationship and offer encouragement early.

"(The Science Fair Program) is an indirect benefit perhaps, but it's a benefit to the nation and the engineering and science core," said Paul. "We are influencing students to move towards a science career path early in the hopes that tomorrow's technology will benefit from their expertise."

Potential judges can find out additional information about Air Force-supported science fairs on the Internet beginning in January. The Laboratory publishes a list of regional fairs on the AFRL web site. Volunteers can check the list for fairs in their area and notify their appropriate point of contact, expressing interest in the program.

For the annual International Science Fair, judges need an advanced degree in a scientific field, such as physics, mathematics, chemistry or biology. Judges discuss the merits of particular projects with other judges who have some expertise in the area.

For more information on the Science Fair Program or volunteering to judge a fair in your area, contact Sobieski at Susan.Sobieski@afrl.af.mil, or call her at (937) 656-9875. **@**

AND THE RESULTS ARE... — A participant from the International Science Fair describes her research to Tim Sharp, a volunteer judge from Air Force Research Laboratory. Sharp said the program was a good opportunity to interact with future scientists. "The total enthusiasm of these young scientists is infectious, and their creativity is amazing," Sharp said.

@Columns

Commander's Corner

by Maj. Gen. Paul

As the century ends - A view of the lab's contibutions

As we embark on a new millennium, I would like to say a few words about our accomplishments over the past two years. In Commander's Corners I have noted our attention to crafting a more business oriented laboratory, explained our corporate board and structure of our sector offices, talked about our strategic plan and the FY 2000 POM, and mentioned the merits of Tech Connect interfacing. I have also covered the tough issues of budget cuts and personnel changes, noted our success in supporting Operation Allied Force, shared my pride in the receipt of the von Karman award, and offered kudos to our the new AFRL Fellows.

Each visit to our sites this year has allowed me a chance to see what our most valuable asset, our people, have achieved.

Now, with great pride, I would like to note some of the scientific and technical accomplishments you have amassed for AFRL. From virtual reality to laser-propelled space vehicles, you break technology barriers and push the envelope in support of the warfighter and the various missions of the Air Force, as well as with technology transfer to civilian industry. While reading a list of proposed story ideas for a news program, I noted the depth and breath of 21st century technology: the data wall; UAVs and UCAVs; Techsat 21; space maneuver vehicles; SOTV; Warfighter 1; the small smart bomb;distributive mission training; and panoramic night vision goggles to mention just a few.

Each directorate has taken science fiction and made it or is in the process of making it science fact: In Air Vehicles: propulsion integration; flow control; computational hypersonics; reconfigurable flight control; simulation based research and development; composite structures and flexible structures.

In Directed Energy: Airborne Laser technology support (program); dynamic compensation experiment; chemical laser technology; LIDAR systems; highly accurate optical acquisition; tracking and pointing technology; active and passive optical imaging; high-resolution imaging; high power microwave (electromagnetic) weapons research; and countermeasure and protection technologies.

In Information: fusion of varied information sources; advanced data storage devices and medium defensive warfare information; DNA optical storage media; DARPA's Next Generation Internet program; and tagging devices for ground equipment and personnel.

In Human Effectiveness: Visually coupled acquisition targeting system transitions to the Joint Helmet Mounted Cueing system; distributed mission training; integrated panoramic night vision goggles; laser eye protection; and the K-36 comparative ejection seat foreign comparative testing program.

In Materials & Manufacturing: designing materials via neurocomputing; vein viewing technology; Title III project which improves night vision systems; new cladding and coating processes to protect critical sensors; and operation of an environmental test site to restore natural environment.

In Munitions: Scientists and Engineers successfully merged a low cost Laser Radar (LADAR) seeker, a highly efficient airframe and a futuristic multi-mode warhead into a small, autonomous weapon that can "think" for itself called Low-Cost Autonomous Attack System, or LOCAAS. Continuing the focus on miniature munition concepts (MMC), MN has also set the technology baseline for the Small Smart Bomb – a 250-lb class weapon effective against moderately hard and soft targets. The Directorate also transitioned the Hard Target Smart Fuze (HTSF) and BLU-116 Advanced Unitary Penetrator (AUP) to the Precision Strike SPO. As its current technology visions are coming to fruition, MN is shifting its attention to munitions to support the Air Expeditionary Force (AEF), functional defeat of hard targets, close air support/urban warfare and counter-proliferation.

In Propulsion: Lightcraft - a small laser-propelled spacecraft; Electric Space Experiment - a 26kw arcjet system; turbine engines for global strike/global reach aircraft; rocket engines - advanced upper stage technology; and hypersonics - engines that can power a vehicle 8 times the speed of sound; and lithium ion batteries

In Sensors: LIFE/LAIRCM - the latest in ground-to-air

(SEE COMMANDER'S CORNER/P.7)

@Columns

CIO Topics

The Virtual Privacy Network; a stealth solution to a hacking problem

In 1879 a patent was granted for a device called the cash register. Thus, the triumph of the machine began on the day we started punching keys instead of writing out receipts. Working in this environment, it is easy to forget that though technology has produced the ability to communicate with only a few taps of the keyboard and a mouse click, the information that we jettison into cyber space may not always be secure or protected.

In AFRL, this problem is compounded by the immediacy of communicating with peers in different time zones or states, and the threat of cyber terrorism that frequently targets the pre-eminent science and technology hub for the world's strongest Air Force. A question we've been forced to ask is, "How can we improve the security posture across a lab that is geographically dispersed?"

A technology solution that AFRL has been researching, and plans to implement in Summer 2000, is the Virtual Private Network (VPN). The VPN will allow each of AFRL's desktop users to encrypt and send information in an electronic tunnel that is buried in the Internet but invisible to outside threats. It will support e-mail and other information sharing applications.

The Air Force Information Warfare Center recommended a standard VPN to Air Staff and have prototyped the technology successfully across 10 bases. This VPN is base to base technology with no provision for organizational separation on bases. The planned AFRL VPN will provide privacy not only from base to base but organization/base to organization/base combinations. In addition, the technical merit of the technology is universally accepted and no throughput effects are noticed on information travelling by VPN.

The importance of this technology to individuals working in the lab is this: a scientist and his peer in another state are discussing the results of research that is not yet cleared for release to the public. The VPN will allow them to communicate and share information regularly without the fear that their information will be viewed by any outside parties.

Though VPN has been tested within a lab setting and has yielded outstanding results, AFRL will conduct additional testing to ensure a higher proof of concept, that we can indeed transmit this encrypted information from directorate to directorate and time zone to time zone.

The Sensors Directorate at Wright-Patterson AFB, Ohio, will spearhead the effort to make sure that technology testing on VPN is completed and established in January. Also involved in this testing will be the comm units at Kirtland AFB, N.M.; Rome, N.Y.; and Hanscom AFB, Mass.

The test will connect the sites, deploy at least one application (a business application, net meeting etc.) across the network. Metrics will be collected and reported to Air Force Materiel Command, and the network will eventually be implemented at all AFRL locations.

In a world where the foresight and knowledge of extraordinary minds have created communication technology and its associated privacy problems, it is up to these minds to find solutions. We hope that VPN technology can provide the needed solution to this problem. **@**

Commander's Corner (from page 6)

countermeasures; sensorcraft - visionary concept for unmanned ISR airborne vehicle; automatic target recognition technology allowing you see to tanks under trees; and advanced concepts for Suppression of enemy defenses.

In Space Vehicles: micro satellites (TechSat 21); deployable optics and Sensors; hyperspectral imaging (Warfighter-1); satellite threat warning and attack reporting; space weather (communication/navigation outage forecasting system, compact environmental anomaly sensor, midcourse space experiment) lightweight space structures (UltraLite); space vehicle integration (MightySat I) space power and thermal management; experimental inflatable space structures; and night vision goggle software.

In the Office of Scientific Research: a consistent supporter of future Nobel Prize winners, investments in basic research continue in many areas of interest, including aerospace and materials sciences, physics and electronics, chemistry and life sciences and mathematics and space sciences. AFOSR also strengthens engineering and science education and research capabilities with a variety of programs. AFRL's international office (IO) is also located at AFOSR and continues to represent our interests in the world arena.

The cutting edge is where you've taken us, and where with your vision, we will continue to explore.

As we face the new millennium, the challenge for AFRL is to advance technologies for an Expeditionary Aerospace Force at the same time we move aggressively into the realm of space technologies. With the new building blocks of a solid strategic plan and corporate strategy, we can truly go where no one has gone before – to lead the discovery, development and timely transition of affordable, integrated technologies that keep our Air Force the best in the world. **@**

Meet AFRL--

What woodworking and the Web have in common

by Timothy Anderl, AFRL Headquarters

With a little foresight and imagination, SMSgt. Barbara Nie hatches a plan to turn something most of us would ignore into something useful. She says that though woodworking can be frustrating —after all if you mess up or miscalculate you have to strip the wood and start all over — with a little patience an ordinary log could become a beautiful table or chair that is suitable for daily use.

It is this same critical thinking and foresight that landed Nie at AFRL after almost 21 years with the Air Force. Nie has served at Luke, Langley, Randolph and Wright-Patterson Air Force Bases as well as spent time in South West Asia and Germany.

When Nie interviewed for her position in AFRL with Lt. Col. Larry Kosiba she admitted that she had been part of an Inspector General team sent to evaluate a few of AFRL's programs. Kosiba told Nie that her keen critical sense and ability to fix problems and make build better programs is what qualified her for her job at the lab.

Currently, Nie leads a team of web developers who are pioneering the Internet and intranet for the three-year-old Air Force Research Laboratory. Nie began her position of Superintendant of Corporate Communications at AFRL/XP at the end of Apr 1999.

"[Working on the web sites] is exciting and it's frustrating. It's exciting because we're in the first stages of the process—It's always great to be on the front end of things," Nie said. "It's frustrating because there aren't a lot of policies and procedures out there, so it's difficult to know if you are doing the right thing."

Coupled with the web savvy of her team, Nie is responsible for building and maintaining AFRL's web communications. When the team encounters a problem it is their differing perspectives on the project that make it possible to turn the problem into a success.

"Because I'm new to web design I ask a lot of questions that they haven't thought about because they've been doing it for so long," Nie said. "I come up with some fresh ideas. I also come up with some that are bogus and ask 'Can we do this'—and [the team] says, 'No Barb we can't do that'. They explain why and together we make a really good team."

Along with building the web efforts of AFRL, Nie has built a career and a family. In November, Nie was selected for a promotion to Chief Master Sergeant. Modestly, Nie says that it would've been impossible for her to imagine her accomplishments had it not been for encouragement from people involved with the Air Force, her mother and father and husband who had certainty that she could do it all along.

Nie, originally from Chicago, lives in Dayton with her husband Jeff, who is also stationed at Wright-Patterson AFB, and three year old daughter, Brina. She enjoys doing things in her free time that involve her family. In addition to woodworking, Nie and her family enjoy visits to the park, picnicking, bike riding and gardening.

Building the community also occupies her free time. She has volunteered with Special Olympics, the Super Saturday program and the Salvation Army.

In the meantime, Nie said the lab and her team will keep her occupied with developing the Corporate Net and brainstorming the addition of video streaming to the AFRL Internet and intranet sites.

"Seeing the end product from what you've envisioned as the end product is what encourages my patience and willingness to continue with a project," Nie said about her woodworking. Nie's willingness to see a project through helps her to maintain the fervor that will make AFRL's web communications a success. **@**

Introducing...Meet AFRL

This issue marks the debut of a new section of the newsletter; Meet AFRL. In the interest of creating a sense of solidarity and camaraderie, the newsletter staff conducted interviews with two of the many people who have helped mold AFRL into the first class organization that it is today.

Because AFRL is geographically dispersed, it is important that we are reminded of the many individuals who may be across the cubicle, base, country or world but who share similar ideas, successes and goals.

If any member of the AFRL community would like an introduction to their peers, to nominate a colleague for the focus of a Meet AFRL feature, or would like to introduce their program office to AFRL, contact your directorate's public affairs representative or contact Tim Anderl at (937) 656-9872 or Timothy.Anderl@afrl.af.mil to set up an interview.

Don't forget to visit the Meet AFRL section on the AFRL intranet for an additional feature story on Dr. Hendrick Ruck, AFRL's associate director of plans and programs for corporate investment strategy. **@**

TD Spotlight--

Space Vehicles Directorate: going where no man has gone before

by John Brownlee, Space Vehicles Directorate

KIRTLAND AFB, N.M. – Unless you are the proverbial "rocket scientist," your understanding of the design challenges military spacecraft developers face is probably a little vague.

But here at the Air Force Research Laboratory's (AFRL) Space Vehicles Directorate, understanding and overcoming those challenges to create and demonstrate durable, lightweight and affordable space vehicle technologies for the warfighter is anything but vague. It is the primary mission, a mission with highly diverse applications.

Led by Christine Anderson, a talented blend of military and civilian scientists and engineers work daily on the next generation of future space vehicles. Such systems will maximize the Air Force's ability to exploit the tactical and safety advantages space offers — namely, the "high ground" military commanders have historically sought when preparing for war.

Today, however, Directorate men and women must solve problems that were unimaginable in the past. They have to comprehend the aerospace environment—that inhospitable region between the earth and the sun—and how it affects military communication, sensors, and weapon systems and their operations.

Once that area is understood, researchers can then fashion technologies more resistant to natural obstacles — such as cosmic radiation and atomic oxygen — found in space or imposed by physics that menace spacecraft longevity and crucial missions.

Some of AFRL's solutions to those problems include planning more autonomous space systems,"hardening" sensitive electronics against radiation damage; developing more efficient power systems such as new batteries and solar cells; managing unwanted heat inside spacecraft; controlling structural vibrations; studying space debris; designing miniature electronics and mechanical devices; and conducting computer modeling, simulation, and wargames.

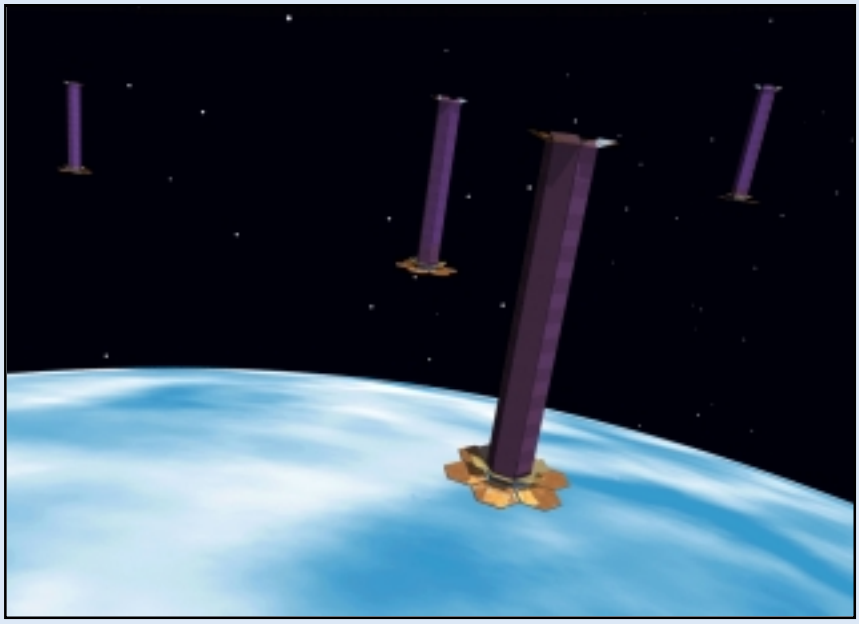
The resulting new technologies then undergo a series of appropriate ground, airborne, balloon or space validation experiments before they are handed-off to the warfighter to become part of the operational Air Force inventory.

And it is here at Kirtland AFB, and at the Directorate's Battlespace Environment Division, located at Hanscom AFB near Boston, Mass., where much of this work is done.

One current Directorate priority in the development of more affordable space systems that are also more responsive to warfighter needs is TechSat 21. TechSat 21 is a planned multi-mission, formation-flying cluster of microsatellites — each satellite weighing about 100 kilograms (220 pounds)—that may some day replace today's single-mission satellites and quickly adapt to rapidly changing warfighter missions.

Future clusters comprised of three to eight satellites based on TechSat 21 technology will 'talk' to each other and share data processing, payload and mission functions now performed by single conventional satellites. They will also be smaller, lighter, and cost less than current systems because they can be mass produced and placed in orbit using smaller launch vehicles — perhaps even by a military jet such as an F-15.

(SEE SPACE/PG.10)



FLYING IN FORMATION— TechSat 21 is a planned multi-mission, formation flying cluster of microsatellites. These may some day replace today's single-mission satellites and quickly adapt to rapidly changing warfighter missions.

Space

(continued from page 9)

Directorate researchers are also working to ensure that the warfighter of the near future can 'see' more of the battlefield, and see it more clearly than ever before. This will be possible due to the Warfighter-1 program and the advancements now being made in hyperspectral imaging technology.

The Warfighter-1 hyperspectral-imaging instrument is a satellite-based technology that uses different sensors to 'see' energy reflected from objects on the ground. This energy appears in the form of "spectral fingerprints" in the visible, near infrared, and short wave light spectrum.

Once sensors detect these so-called fingerprints, "signature" libraries may be used to identify specific materials — e.g., rooftops, parking lots, grass, mud, different kinds of vehicles — by comparing a library's pre-existing reference catalogs with freshly taken hyperspectral images of a battlefield from space.

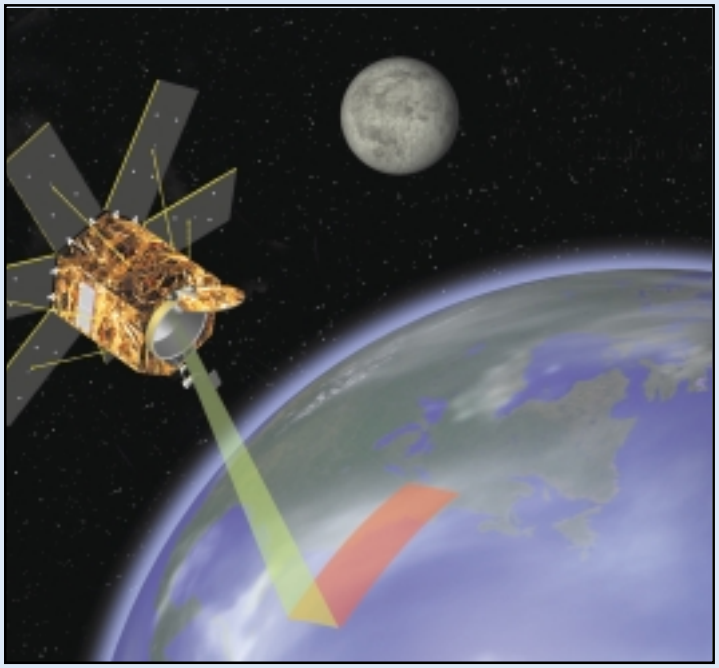
This method of remote sensing can also categorize types of terrain and vegetation (useful in counter-narcotics operations), detecting features such as disturbed soil, stressed vegetation, and whether the ground will support the movement of military vehicles.

Reducing the mass of large space structures such as antennas, radar dishes, and optical components by as much as ten times down to a few hundred pounds from many thousands of pounds is also a Directorate specialty. The latest innovation in that effort looks something like an oversized contact lens for a myopic Jolly Green giant but is actually a potential means to shrink the size and weight of spacecraft and, as a result, lower expensive launch costs.

Using tightly packed, thin-film plastics such as that depicted in the photograph that inflate and deploy like a life raft from the launch vehicle once it's in orbit may substantially reduce the heavy volume of contemporary stowed metallic or composite payloads. As launch costs today run about $10,000 per pound, lighter and smaller payloads mean the use of cheaper classes of launch vehicles.

Through these examples and many others, AFRL's Space Vehicles Directorate works to advance innovative and affordable space technologies for the warfighter and, ultimately, for the defense of the nation and its allies.

For more information about the Space Vehicles Directorate or any of its programs, visit its web site at www.vs.afrl.af.mil. **@**



A VIEW FROM ABOVE— The Warfighter-1 hyperspectral-imaging instrument is satellite-based technology that uses sensors to 'see' energy reflected from objects on the ground.

DID SOMEONE LOSE A CONTACT— Inflatable space structures are a potential means to shrink the size and weight of spacecraft and, as a result, lower expensive launch costs.

Net Index

Due to the number of submissions we receive, some sections of *news@**afrl*** are available exclusively on-line. The on-line version of the newsletter allows users to view the AFRL corporate calendar, news releases generated by AFRL headquarters, operating instructions, L@b L@urels and Roundups sections.

The L@b L@urels section of the electronic newsletter is dedicated to members of Air Force Research Laboratory who receive awards and honors. The Roundups section of the electronic newsletter keeps Air Force Research laboratory employees informed about contracts AFRL has awarded. Below is an index of articles one can find in each of these on-line sections.

L@b L@urels

Roundups

To view the full text of these and other articles visit the *news@**afrl*** page on the Intranet.

To submit L@b L@urels or Roundups from your directorate, send a query to:

Timothy.Anderl@afrl.af.mil